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May 15, 1958

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Dear [REDACTED]

[REDACTED] has been requested to prepare a proposal on construction of a whistle suitable for mounting on an airplane. This whistle is intended to be of the type used during World War II, known as the "Jericho Whistle". We are pleased to submit the following outline of the work leading to a whistle of this type.

The whistle in question has been described to us briefly by Henning von Gierke, of the Wright Air Development Center, who was formerly associated with its development and use in the German Air Force. The whistle is essentially of the Edelmann type⁽¹⁾. It consists of an annular slit through which the air flows and an annular edge upon which the flowing air impinges after passing through the slit. The cylindrical piece containing the edge forms the walls of a cylindrical cavity which provides the resonant element of the whistle and, hence, controls the frequency of the sound generated. In addition to the control by the length of this resonant cavity, the operation of the whistle is controlled by the distance from the slit orifice to the edge. This type of whistle, as measurements have shown, is almost wholly independent of the pressure of the air flowing through the annular slit. This feature is desirable for the intended application.

The sound power measurements from whistles of this type indicate that they will generate as much as 10 watts of acoustical power⁽²⁾⁽³⁾. A typical airplane of the type used generates the order of 500 watts. The latter power is, of course, broad band so that the energy in any small part of the band will be considerably less, perhaps as low as 1/10 watt in a 1 cycle band. This means that the whistle which generates 10 watts in a narrow band should be audible over the background of the airplane noise. It should, therefore, be expected that the effects ascribed to this whistle and airplane annoyance system are attainable, particularly if the device is used on a diving airplane in which no power is delivered to the propeller by the engine.

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The size of the whistle will be determined by the operating frequency. This frequency has been stated by von Gierke to be the order of 1000 cps. In view of this, the resonant cavity should be approximately 17 centimeters in depth. For the simplest operation the diameter should be small in comparison so that it would likely be the order of 1 or 2 inches. The total length of the whistle would probably be not more than 1-1/2 feet. It is expected that some arrangement for increasing the air take into the whistle may be desirable. This would be achieved by a suitable air scoop arrangement. If you have no objections, we propose to use brass for the whistle construction. Some flexibility will be built into it to enable adjustment for optimum performance in terms of frequency and power output.

The following is an estimate of the cost for constructing and evaluating the performance of four whistles of this type.

Total Estimated Cost \$2,983.

If you should have any questions concerning this proposal we will be glad to hear from you.

Respectfully submitted,

APPROVED:

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- (1) M. Th. Edelmann, Ann. d. Physik 2 496 (1900).
 - (2) "Ultrasonic Signalling", OSRD No. 5012, Penna. State College, Mar. 1945.
 - (3) "Atmospheric Physics and Sound Propagation", Staff Acoustics Laboratory, Penna. State College, Sept. 1950 (For Signal Corps Engineering Laboratories, Fort Monmouth, N. J., Contract W36-039-SC-32001).